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Food & Nutrition **Research Briefs**

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Yes, You Can Mix Oil and Water

Low-fat ice cream with that old-fashioned taste and texture is one of many foods that may be developed using a new fat substitute called Fantesk. A blend of starch, water and tiny droplets of oil, this versatile product also may find its way into low-fat meat products, margarines and coatings that hold buttery flavor for diet popcorn. Fantesk also promises a variety of nonfood uses.

ARS scientists found that a starch-oil combo formed a thick gel when processed in superheated steam under pressure. And it did not separate after cooling. Further, the gel did not separate after freezing, thawing and even melting in a microwave, making it an ideal food ingredient. The presence of vegetable or animal fats makes Fantesk act as an emulsifying or dispersing agent, letting it mix with materials, such as some pharmaceuticals, that don't themselves mix well with water.

Usually 15 to 30 percent vegetable oil, Fantesk can be dried and milled into an easily flowable powder that can later be redispersed in water to make soft gels. This saves the cost of transporting a water-laden product. The researchers made a film of Fantesk containing limonene, the volatile oil from citrus rinds, and another film incorporating fresh strawberries. Such films release aromas and flavors when chewed. Opta Foods of Bedford, MA, has applied for an exclusive license for food applications of Fantesk. *For more information, contact Kenneth Eskins, (309) 681-6566 or George F. Fanta, (309) 681-6356, National Center for Agricultural Utilization Research, Peoria, IL.*

Magnesium Calms the Brain

People don't need to become severely deficient in magnesium for the brain to become hyperactive. A new study confirms earlier reports that a marginal magnesium intake overexcites the brain's neurons and results in less coherence—creating cacaphony rather than symphony—according to electroencephalogram (EEG) measurements. During half of the six-month study, 13 women consumed

115 milligrams of magnesium daily—or about 40 percent of the Recommended Dietary Allowance (RDA). During the other half, they got 315 mg daily—a little more than the 280 mg recommended for women. After only six weeks on the marginal intake, EEG readings showed significant differences in brain function.

Magnesium is the fourth most abundant element in the brain and is essential in regulating central nervous system excitability. Clinical studies of people severely deficient in this essential element have reported epilepsy-type convulsions, dizziness and muscle tremors or twitching as well as many psychological symptoms, including irritability, anxiety, confusion, depression, apathy, loss of appetite and insomnia. While the marginal intake in this study did not produce such severe symptoms, it did hype brain activity.

This is the first experimental study in which magnesium intakes were tightly controlled and EEG measurements were analyzed by computer so they could be statistically compared. Good sources of magnesium include whole grains, nuts, peanut butter, cottonseed, peanut and soybean flours, green leafy vegetables and spices. It's better to get magnesium from foods rather than supplements because high doses have a laxative effect—the body's way of preventing toxic levels. *For more information, contact James G. Penland, (701) 795-8471, Grand Forks Human Nutrition Research Center, Grand Forks, ND.*

A Food Process That Solve-nts Pollution

A machine that removes fats, chemical residues and other compounds from food products by using harmless carbon dioxide will be commercialized by Applied Separations of Allentown, PA. The machine is a multipurpose supercritical fluid extractor (SFE), developed jointly with ARS scientists. Besides removing fats, it could be used to extract residues of herbicides and pesticides from grains and meats, and to remove trace antibiotics, nitrosamines and hormones from meat. To extract materials, it uses carbon dioxide instead of toxic organic solvents. The U.S. Environmental Protection Agency has mandated that use of these organic solvents be reduced or eliminated because of their harmful environmental effects. Applied Separations will also do pilot tests of SFE for industrial

**Summary of Dietary Guidelines
Advisory Committee report inside**

uses. *For information from ARS, contact Robert J. Maxwell, (215) 233-6433, Food Safety Research Unit, Philadelphia, PA.*

Greens and Yellows May Extend Clear Sight

Vitamin E, vitamin A and two other antioxidants—lutein and zeaxanthin—have been found in the eyes' lenses, suggesting they may help protect against the formation of cataracts. Analyzing both healthy and cataract-clouded human lenses removed during surgery, researchers found significant levels of vitamins E and A, lutein and zeaxanthin. These latter two compounds are carotenoids—plant pigments related to beta carotene—and are abundant in yellow and dark green leafy vegetables, such as spinach, broccoli and kale. No other carotenoids, including beta carotene and lycopene—two major carotenoids in human blood—were found in the lenses. Population studies have shown a relationship between carotenoid or vitamin A levels in the blood and a lower incidence of cataracts.

Of the 31 lenses analyzed, those removed from Asian Indians, who traditionally eat a lot of vegetables, had significantly higher levels of the antioxidants than those from Americans. Among the American lenses, antioxidant levels differed significantly, possibly reflecting a wide difference in vegetable intake among Americans. *For more information, contact Kyung-Jin Yeum, (617) 556-3128, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts Boston, MA.*

Cheap Algae Could Curb Mouth Cancer

A daily dose of the blue-green algae *Spirulina* may help prevent cancer of the mouth, a study shows. The finding could benefit people in developing countries, where the algae is cheaper than vitamins. After one year of consuming only one gram of the algae daily, 45 percent of the volunteers had complete regression of the thick, white, precancerous patches in the mouth known as leukoplakia. Adding in those volunteers who showed significant improvement raised the figure to 57 percent who benefitted from *Spirulina*. That compared to seven percent of those who improved when taking a placebo.

The study—the first human evaluation of the cancer-preventive potential of *Spirulina*—was coordinated by an ARS researcher and conducted in southwestern India where the incidence of leukoplakia is high. The researchers tested *Spirulina* because it is an inexpensive source of beta carotene and related carotenoids in many developing countries. In other research, the algae has inhibited oral cancer in animal studies, while beta carotene or vitamin A supplements have reversed precancerous conditions in people's mouths. Cancer of the mouth and of the cervix—which has the same kind of mucus membrane—are on the

rise worldwide. *For more information, contact Padmanabhan P. Nair, (301) 504-8145, Beltsville Human Nutrition Research Center, Beltsville, MD.*

School Cafeterias To Serve Leaner Pizza

Major dairy manufacturers have contracted to supply 1.3 million pounds of ARS-developed, low-fat mozzarella cheese for USDA's national school lunch program. Containing 50 percent less fat than standard mozzarella, the new low-fat cheese melts and tastes just like the regular kind that usually tops pizza. In trials in public schools throughout the country, most students couldn't tell the difference between the low-fat and the full-fat cheese. *For more information, contact Edyth L. Malin, (215) 233-6444, Dairy Products Research Unit, Philadelphia, PA.*

Hottest Pepper Yet Hits Market and Garden

A cayenne pepper that sent an ARS laboratory into overdrive to fill 28,000 requests for seed has sped to the market in two years. Charleston Hot, released in early 1993, made its dinner table debut this year in two new hot sauces—Holy City Heat, made by Atlantis Coastal Foods, in Charleston, SC, and Charleston Hell Hot Sauce, made by Three Amigos restaurants. Also, at least nine outlets are selling Charleston Hot seed: DeGiorgi Seed Company, Omaha, NE; Jones Deade, Charleston; Pepper Joe's, Inc., Norristown, PA; Pepper Gal, Ft. Lauderdale, FL; R.H. Shumways, Graniteville, SC; R.H. Shumway's Totally Tomatoes, Augusta, GA; Rupp Seeds, Wauseon, OH; South Carolina Foundation Seed Association, Clemson, SC; and Nanjemoy Flower and Herb Farm, Nanjemoy, MD. *For more information, contact Philip D. Dukes or Richard L. Fery, (803) 556-0840, U.S. Vegetable Laboratory, Charleston, SC.*

Two Tests Needed for Homocysteine

When clinicians measure blood levels of the amino acid homocysteine only after an overnight fast, they could miss nearly half of the people with elevated levels. And high homocysteine levels have been linked to increased risk of heart disease and stroke. A second measurement—taken after a dose of another amino acid, methionine, commonly gotten from foods—is needed to identify all cases, according to a study of 247 volunteers. That's because some people have a low tolerance for methionine and convert it rapidly to homocysteine, which raises blood levels. High blood levels of homocysteine may be damaging to arteries. Both tests are needed because three vitamins are involved in homocysteine metabolism. The overnight fast test reveals those people with folate

Dietary Guidelines Advisory Committee Accentuates the Positive

The 1995 Dietary Guidelines for Americans will stress the enjoyment of foods—a wide variety of them—rather than convey the impression of many foods as “bad” for health, according to the 52-page report of the Dietary Guidelines Advisory Committee. It was submitted this summer to the Secretaries of Agriculture and Health and Human Services. After reviewing the committee’s recommendations, the departments will finalize the text for the 1995 revision and issue a consumer brochure late this year or early next year.

The committee suggested “language that is deliberately positive and intended to convey a message of enjoyment of foods as an underlying principle,” the report states. “The Dietary Guidelines apply to diets consumed over several days, and not to single meals or foods,” said committee chair Doris Calloway of the University of California, Berkeley. The guidelines are aimed at Americans age two and above and are not intended for infants and toddlers under two years.

The committee recommended leaving the first guideline, “Eat a variety of foods,” unchanged from the 1990 edition. They suggested adding an explanation of variety in relation to vegetarian diets for the first time and distinguished between enriched and fortified foods.

Recognizing the growing obesity problem in this country and the many health risks it imposes, the committee expanded the second guideline to recommend that Americans “balance food intake with physical activity” to prevent weight gain—which is now the primary target. It also recommends that people “maintain or improve your weight” as a major goal.

“The committee felt that maintaining weight is a more reasonable goal than losing weight. The ability to

lose weight and keep it off has been disappointing to most people,” said Calloway, noting that people with risk factors for chronic diseases still may need to lose. The report admonition that “most adults should not gain weight” is a shift from the long-accepted view that people naturally gain weight during middle age.

The committee also placed more emphasis on plant foods in healthful diets, moving the guideline to “choose a diet with plenty of vegetables, fruits and grain products” ahead of the advice to “choose a diet low in fat, saturated fat and cholesterol.” That was done for consistency with the Food Guide Pyramid, in which grains, fruits and vegetables form the base.

While the recommendations on fat do not apply to infants and toddlers to age two, the report notes that “children should adopt a diet that, by about five years of age, contains no more than 30 percent of calories from fat.”

Because sugar, salt and sodium are contained in prepared and processed foods, the committee changed guidelines five and six from using these “only in moderation” to “choosing a diet moderate” in sugars, salts and sodium. They advise Americans to use the new Nutrition Facts Label, available on all processed foods and many other foods, to estimate their intake of fat, cholesterol and salt/sodium.

The seventh guideline, recommending that those who drink alcohol beverages do so in moderation, was left unchanged. But the report added that it’s best to take alcohol with meals. Noting that alcohol is calorie dense, the report includes the calorie value of beer, wine and distilled spirits. *For more information on the report, contact Debra Reed, executive committee secretary from USDA, Agricultural Research Service, (202) 720-3804.*

(folic acid) or vitamin B₁₂ deficiency, while the methionine test detects people who lack vitamin B₆.

Also, the researchers streamlined the second test so homocysteine can be measured two hours after a dose of methionine instead of four or six hours. *For more information, contact Andrew G. Bostom or Jacob Selhub, (617) 556-3356/-3191, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts, Boston, MA.*

Body Fat, Growth Differ By Ethnic Group

One in three girls and one in four boys had body fat levels considered obese for adults, according to a study of more than 600 children and teens living in the Houston area. That’s a big jump from 20 years ago when only one in six girls and boys exceeded the obesity threshold for

adults—32 percent fat for women and 25 percent fat for men.

The study, which is still ongoing, also found differences among white, black and Hispanic youths. Hispanic youths had the highest average body fat—32 percent for girls and 24 percent for boys. White girls had the lowest average body fat—26 percent—among the females. And black boys averaged the lowest—19 percent—among the males. All subjects were measured by two highly accurate methods for assessing body composition: dual energy x-ray absorptiometry (DEXA) and emissions of potassium-40, a radioactive form of the element occurring naturally in the body in tiny amounts.

This is the only study worldwide to assess fat and lean composition of children in different ethnic and racial groups. When complete, it should produce data on 1,000

children—enough for developing charts that show normal ranges of body composition similar to the height and weight growth charts in pediatricians' offices.

Another finding in this study of more than 600 youths is that black children start their growth spurt two to five years earlier than white or Hispanic children. This points to the need to customize dietary recommendations for different ethnic groups to provide the protein and minerals children need at the time they need them.

Black girls and boys tend to grow taller and heavier and mature faster than white or Hispanic children. At age 6, black girls begin adding significantly more muscle and bone than white or Hispanic girls, while these two groups wait till around age eight or nine for their growth spurt. Black boys begin to outpace white and Hispanic boys at age seven and grow even faster at age 12, when white and Hispanic boys are beginning their growth spurts.

Current data on changes in body composition—fat, muscle and bone—during childhood were developed from data gathered in the 1950's, 60's and 70's on white children only. And they only give an average value for different ages. This ongoing study of boys and girls, ages three to 18, aims to develop body composition charts showing the range of normal growth patterns among the major ethnic groups in this country. It shows that today's youths are bigger and taller than those of three to four decades ago and have more body fat. *For more information, contact Kenneth J. Ellis, (713) 798-7132, Children's Nutrition Research Center, Houston, TX.*

Female Fitness Differs by Race

Black adolescent girls had lower aerobic capacity than their white counterparts during a treadmill test, even though both ethnic groups had the same amount of body fat. Researchers conducted the study of 93 girls, ages 11 to 16, because information on the physical fitness of U.S. adolescents of different ethnic origins is scanty. So they measured peak oxygen consumption—an indicator of fitness known as VO_{2max} —in 40 black girls and 53 white girls while they ran on a treadmill to the point of exhaus-

tion. The black girls consumed 17 percent less oxygen than the white girls during the test and reached exhaustion nearly a minute earlier—8.5 vs. 9.4 minutes. Blood tests showed that hemoglobin—the oxygen-carrying molecule in red blood cells—was six percent lower in the black girls. Studies done in other countries suggest that ethnicity contributes to differences in aerobic fitness. Researchers don't yet have an explanation but suspect both genetics and lifestyle contribute to the differences. They are currently analyzing data they collected on the girls' body composition and resting metabolic rate for clues. *For more information, contact William W. Wong, (713) 798-7168, Children's Nutrition Research Center, Houston, TX; or James M. Pivarnik, (517) 353-3520, now at Michigan State University, East Lansing, MI.*

Boron Doesn't Cool Hot Sweats

A daily boron supplement did not relieve hot flashes and night sweats in a majority of women going through menopause, contrary to some reports by women who take extra boron. Half of the 46 women in a controlled, five-week study reported more frequent and severe hot flashes and night sweats, which interrupted sleep, and more total menopausal symptoms while taking a 2.5-milligram boron supplement than when they got a placebo. Only 15 percent of the women reported benefits, while 35 percent reported no difference.

Boron supplements are being recommended by some pharmacies and health food stores based on reports from women who have gotten relief. According to this small study, however, extra boron may exacerbate menopausal symptoms or have no effect more often than it counteracts them. *For more information, contact James G. Penland, (701) 795-8471, Grand Forks Human Nutrition Research Center, Grand Forks, ND.*

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